Please add the following new claims:

18. (NEW) The infrared imaging optical arrangement of claim 15, wherein the moldable IR transmissive material is an arsenic selenide glass.

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19. (NEW) The infrared imaging optical arrangement of claim 13, wherein the moldable IR transmissive material is an arsenic selenide glass.

REMARKS

Entry of the foregoing, reconsideration and allowance of the subject application are respectfully requested.

As correctly noted in the Office Action Summary, claims 1-17 were pending with claims 8-12 having been withdrawn from consideration. By the present response, claims 18 and 19 have been added, claims 1, 3, 7, 15 and 17 amended, and claims 2, 8-12 and 16 canceled. Thus, upon entry of the present response, claims 1, 3-7, 13-15 and 17-19 remain pending and await further consideration on the merits.

Support for the present claim amendments can be found, for example, in at least the following portions of the disclosure: the original claims and specification, paragraphs [0007], [0013] and [0014].

CLAIM REJECTIONS UNDER 35 U.S.C. §102

Claims 1-7 and 13-17 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,018,414 to Chipper (hereafter "*Chipper*") on the grounds set forth in paragraph 6 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The claims in this application are directed to an IR lens and an infrared imaging optical arrangement. As set forth in claim 1, the IR lens is a moldable IR transmissive material and at least one surface includes a surface relief holographic grating. Claim 7 recites that an IR lens has a first surface and a second surface and is made from a moldable IR transmissive material. At least the second surface includes a surface relief holographic grating molded from the moldable IR transmissive material. Claim 13 recites that an IR lens comprises a first spherical surface and a second non-spherical surface. The second non-spherical surface comprises a surface relief holographic grating and the lens is made from a moldable IR transmissive material.

Independent claim 15 is directed to an infrared imaging optical arrangement. The infrared imaging optical arrangement includes a first lens and a second lens at least the first lens is made from a moldable IR transmissive material. At least the first lens has at least one surface including a surface relief holographic grating.

The *Chipper* patent discloses an infrared lens assembly. The infrared lens assembly includes a focusing component, a collecting component, and a diffracting component. As shown in Figs. 2A and 2B, the lens assembly 16 includes an objective lens 32, zoom lenses 34 and 36, and a collecting lens 38. This patent describes that lenses 32, 34, 36 and 38 can

be made from a material that includes Gallium Arsenide and chalcogenide glass, such as TI 1173. See column 6, lines 12-15. This patent also describes that the objective lens 32, zoom lenses 34 and 36 and collecting lenses 38 and 40 can include aspheric surfaces. See column 6, lines 53-55. The aspheric surfaces of the lens elements are disclosed as being formed by press molding or by grinding operations. See column 7, lines 28-29. *Chipper* continues and discloses diffractive lens 42 and 44 having a diffractive surface that may be a kinoform produced by diamond point turning, patterning and etching or the like. See column 7, lines 58-62. *Chipper* also discloses that the diffractive lens is formed from a polymer. See column 9, lines 29-32.

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Thus, *Chipper* is concerned with a lens system with multiple lens elements, but does not teach or suggest a lens of a moldable IR transmissive material and including a surface relief holographic grating as recited in independent claims 1, 7, 13, and 15. *Chipper* makes a distinction between a first group of lens elements, 32, 34, 36, 38 and 40, that can be formed so as to include an aspheric surface and a second set of diffractive lenses, 42 and 44, that include a kinoform. Lenses 32, 34, 36, 38, 40, which can have aspheric surfaces, are formed from materials such as Gallium Arsenide and chalcogenide glasses by either press molding or grinding operations. However, *Chipper* distinguishes between lenses formed by molding of chalcogenide glass, which can have an aspheric surface, and elements formed by diamond point turning of polymer, which have a kinoform. It appears that the Examiner has improperly applied *Chipper's* disclosure relating to diffractive lenses of polymer having a kinoform formed by the removal of materials, such as by diamond point turning, patterning and etching, to molding of simple aspheric surfaces of lens

elements formed from chalcogenide glasses. Accordingly, applicants respectfully submit that the anticipatory rejection is improper since *Chipper* does not disclose the invention as claimed and independent claims 1, 7, 13 and 15 are considered allowable.

Applicants' dependent claims recite additional features that render them further allowable. For example, *Chipper* does not disclose or support a moldable IR transmissive material of arsenic selenide glass as presented in claims 5, 18 and 19. At column 6, *Chipper* discloses that a material can include Gallium Arsenide and chalcogenide glass such as TI 1173. As presented in the attached product description, TI 1173 is equivalent to AMTIR-3. AMTIR-3, available from Amorphous Materials Inc. of Garland, Texas as disclosed at paragraph [0021] of the specification, has a composition of $Ge_{28}Sb_{12}Se_{60}$. Thus, *Chipper* neither discloses nor suggests a moldable IR transmissive material of arsenic selenide glass.

Regarding claim 6, the lens system 16 of *Chipper* is disclosed as multiple lens elements. In contrast and according to claim 6, the lens having the surface relief holographic grating and formed from an arsenic selenide glass are "manufactured as a unitary structure in a molding operation." Thus, the disclosure in *Chipper* to multiple lens elements, where lens elements formed of Gallium Arsenide or chalcogenide glass have an aspheric surface and separate lens formed of polymer as a kinoform, does not anticipate claim 6. For at least these reasons, applicants' dependent claims are further allowable.

CONCLUSION

A Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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Date: August 16, 2002

Attachment to Amendment dated August 16, 2002

Marked-up Claims 1, 3, 7, 15 and 17

1. (Amended) An IR lens comprising:

a first surface; and

a second surface,

wherein the IR lens is a moldable IR transmissive material and at least one surface [is an optically significant surface] includes a surface relief holographic grating.

3. (Amended) The IR lens of claim [2] 1, wherein the [optically significant surface] surface relief holographic grating is formed directly in a molding operation.

7. (Amended) An IR lens comprising:

a first surface; and

a second surface,

wherein the IR lens is made from a moldable IR transmissive material and wherein at least the second surface [is an optically significant surface] includes a surface relief holographic grating molded from the moldable IR transmissive material.

Attachment to Amendment dated August 16, 2002

Marked-up Claims 1, 3, 7, 15 and 17

15. (Amended) An infrared imaging optical arrangement comprising:

a first lens; and

a second lens, wherein at least the first lens is made from a moldable IR transmissive material and wherein at least the first lens has at least one [optically significant surface] surface including a surface relief holographic grating.

17. (Amended) The [IR lens] infrared imaging optical arrangement of claim 15, wherein the moldable IR transmissive material is a chalcogenide glass.

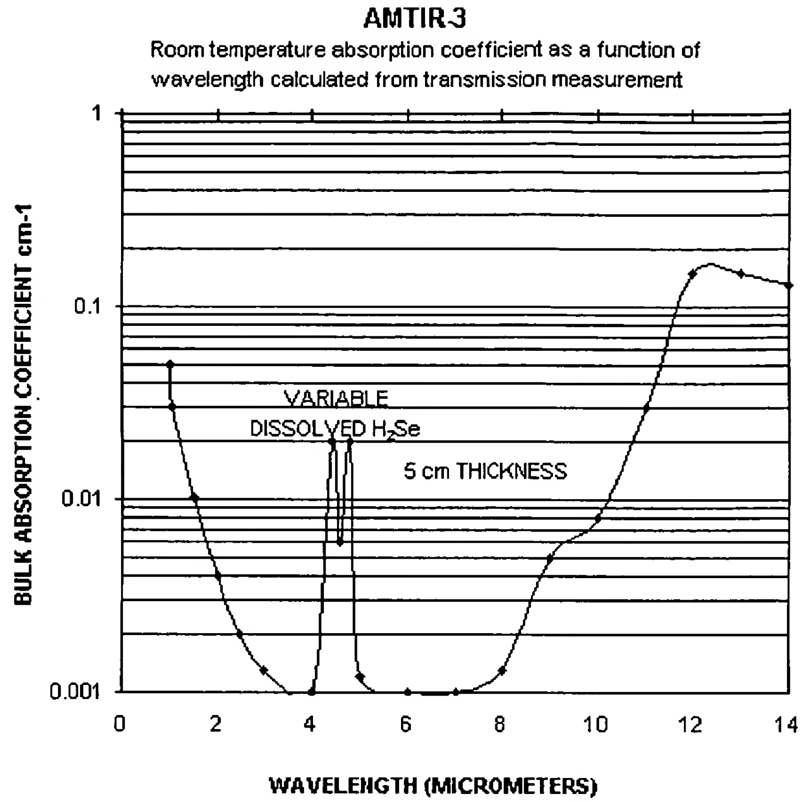
Products

AMTIR-3 (TI 1173 EQUIVALENT)

The name **AMTIR** is an acronym for amorphous material transmitting infrared radiation. The glass is melt formed and can be cast or slumped into most any size or shape. The material offers high optical homogeneity at low cost Plates up to 12" X 18" are currently available. The upper use temperature is 200°C with no free carrier absorption as is found in crystalline materials. The 8-12 μm dispersion of 110 fits well with germanium for a color corrected lens design. The thermal change in refractive index (91 X 10^{-6}/°C) is relatively low, a definite aid to systems designers in trying to avoid thermal defocussing. AMTIR-3 is resistant to chemical attack by dilute acids, bases and organic liquids.

GENERAL PROPERTIES OF AMTIR-3

Composition	$Ge_{28}Sb_{12}Se_{60}$ Glass
Density	4.67 gms/cm^3
Thermal Expansion	13.5 X 10^{-6}/°C
Hardness (Knoop)	150
Rupture Modulus	2500 psi
Young's Modulus	3.11 X 10^6 psi
Shear Modulus	1.22 X 10^6 psi
Poisson's Ratio	0.26
Thermal Conductivity	5.3 cal / cm sec°K X 10^{-4}
Specific Heat	0.066 cal / gm °K
Upper Use Temperature	200°C
Resistivity	5 X 10^{11} Ω cm @ 500Hz
Glass Transition Temperture	278°C
Annealing Temperture	285°C



REFRACTIVE INDEX AND ABSORPTION COEFFICIENT FOR AMTIR-3 (Measured)		
WAVELENGTH μm	REFRACTIVE INDEX 25 C	ABSORPTION COEFF cm^{-1}
3	2.6266	0.01
4	2.6210	0.01
5	2.6173	0.02
6	2.6142	0.01
7	2.6117	0.01
8	2.6088	0.01
9	2.6055	0.01
10	2.6023	0.01
11	2.5983	0.03
12	2.5942	0.13
13	2.5892	0.20
14	2.5843	0.20

AMTIR-3 THERMAL CHANGE IN REFRACTIVE INDEX 25-65°C $\Delta N / \Delta T°C \times 10^6$		DISPERSION 3-5 µm 174 8-12µm 110
Wavelength µm	LOW 25-(-197°C)	HIGH (25-150°C)
3	+58±2	+98±4
5	+57±2	+92±4
8	+55±2	+87±8
10	+56±2	+91±11
12	+56±2	+93±6

Precise refractive index values are obtained by performing minimum deviation measurements on prisms fabricated from standard production plates. Values are average. Batch-to-batch variation is less than ± 0.0050. Measured optical homogeneity for a 159mm diameter plate 21mm thick was $\pm 50 \times 10^{-6}$ or $\Delta N/N = 19 \times 10^{-6}$. (Scott Sullivan, Exotic Materials, 1991)

Pricing: Is determined by size and weight.

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